

- Cupper, J. and L. Cupper. 1981. Hawks in focus. Jaclyn Enterprises, Mildura, Australia. 208 pp.
- Ratcliffe, D. A. 1962. Peregrines incubating kestrel's eggs. *Brit. Birds* 55:131-132.
- Ratcliffe, D. A. 1963. Peregrines rearing young kestrels. *Brit. Birds* 56:457-460.
- Walton, B. J. 1978. Peregrine-prairie falcon interactions. *Raptor Res.* 12:46-47.

OBSERVATIONS ON THE USE OF RANGLE BY THE PEREGRINE FALCON (*FALCO PEREGRINUS TUNDRIUS*) WINTERING IN SOUTHERN BRASIL

by

Jorge L. B. Albuquerque

Caixa Postal 10323

90.000 Porto Alegre, Rio Grande do Sul
Brasil

The use of rangle, or gastroliths was investigated and summarized by Fox (1976). Some questions arose from his observations and comments, namely: (1) How frequently is rangle used by wild falcons, and (2) What factors stimulate the falcons to use rangle?

Recently I have been involved in a study of the Arctic Peregrine Falcon, *Falco peregrinus tundrius* (Albuquerque 1978 and unpublished M.S.) wintering in Brasil. In the austral summer season, 1979, I observed one adult female on several occasions picking up gross grit from a sand storage on top of an old building under construction in downtown Porto Alegre. It was also recorded regurgitating this gross grit.

Field Observations

1. Porto Alegre (30°00' S, 51°10' W) 24 January 1979 at 1555. The adult female perched on top of an old building under construction, took a bath and picked up gross grit from a sand storage. *Remarks:* She consumed about 238 g of food over the last two days (119 g/day). I found carcasses in her favorite plucking place of the following prey species: 1 adult *Columba livia*, 3 rails (2 *Laterallus melanophaius* and 1 *Porzana albicollis*).

2. Porto Alegre, 14 February 1979 at 0545. She performed the same behavior as mentioned above. *Remark:* She ate 1 pigeon nestling weighing 120 g and 1 passerine of about 30 g over the 2 previous days and 2 passerines on this last day. One can tentatively estimate a food consumption of 210 g (105 g/day). In this instance, there is a decrease in food ingested from 105 g/day to 60 g/day on the last day.

At 0546 she regurgitated a significant portion of the gross grit swallowed minutes before. The grit was coated with mucous and her defecation was discolored like those described by Fox (op. cit.).

3. Porto Alegre, 16 February 1979 at 0634. She performed the same behavior mentioned above, except that regurgitation of grit was not noted. *Remarks:* Previously she was seen eating on 1 pigeon fledgling 2 days before swallowing the rangle, and was not seen eating anything on the previous day.

4. Porto Alegre, 3 March 1979 at 0613. She perched on a ledge of a waterfront building watching a rail flying close to the water (Albuquerque, unpublished M.S.). Before trying to intercept the rail, she regurgitated large amounts of gross grit. It was possible to see the sand and grit being cast up by the falcon. *Remarks:* She ate 1 fledgling the previous day.

5. Palmares (31°10'07" S, 51°20'08" W) 16 January 1980 at 1630. An adult female flew from a dirt road to a wet field as we approached in a vehicle. After a few minutes, she flew across the road to a termite mound and there cast up an object. Immediately thereafter, she began to hunt in a very direct manner, flying fast and coursing low over the ground. We later examined the termite mound to gather possible prey remains, but instead we found 2 large stones (12 × 10 mm and 20 × 20 mm) like those on the dirt road. They were moist and had an acrid smell. Her feces on the mound were dark and of oily appearance similar to those of an unfed captive falcon (C. M. White, pers. comm.).

Discussion

The theory on functions of gastroliths in seals and sea lions (Emery 1941), that on trituration, to crush worms and alleviate ulcers could also be correct for birds. The triturations function seems unlikely in raptors (Fox 1976), but rangle could stimulate and promote gastric secretions. Both mechanical and chemical stimulation act on gastrin producing cells and gastrin stimulates the secretion of hydrochloric acid (Jorgsen, 1977).

Falcons observed in Porto Alegre and Palmares performed hunting behavior sequences in association with the use of rangle. In both places they had fasted or at least gone without recent food when recorded using rangle, either in the morning or in the evening. In terms of an energy budget, it is advantageous to the predator to use one behavior that contributes to the maximization of its digestive efficiency.

Literature Cited

- Albuquerque, J. L. B. 1978. Contribuição ao conhecimento de *Falco peregrinus* na América do Sul. *Rev. Brasil. Biol.*, 38:727-737.
- Emery, K. O. 1941. Transportations of rock particles by sea mammals. *J. Sediment. Petrol.* 11:92-93.
- Fox, N. 1976. Rangle. *Raptor Research* 10:61-64.
- Jorgsen, C. B. 1977. Nutrition. pp. 16-54 in Gordon, M.S. (ed) *Animal physiology, principles and adaptations* Third Ed. Macmillan Pubs. New York.

BOOK REVIEWS

Hawks in Focus. Jack and Lindsay Cupper. 1981. Jacklin Enterprises, Mildura, Australia. 208 pp, 315 photos, 26 maps. \$29.50 U.S. (obtainable through Jacklin Enterprises, P.O. Box 348, Merbein, Vict. 4505, Australia, plus postage, approx. \$2.00).

This is a delightfully written book, especially for one familiar with Australia. As I read about the dust storm with fierce hot winds approaching the authors as they photographed from a tower, the all too vivid recollection of my experience in the mallee of Victoria with dust so thick in the air it could be cut, and high winds of temperatures exceeding 100°F, came to my mind. My experience was exciting and I was gripped with nostalgia as I read about theirs. By the same token, the one minor complaint or drawback I found with the book is the sometimes lengthy discussions of the authors' trials, tribulations and experiences, but which really had nothing to do with raptors. It is by design, however, that the authors describe their feelings about their work and their adventures so that the reader may visit all 24 species of diurnal raptors of Australia vicariously. For each species photographs show a normal egg clutch, adults at the nest with young, the adult perched, a bird in flight, and generally a habitat view. In a random sample of 5 species there were on average 13 photographs per species (range 6-20).

Anyone who has tried to climb 20-30 meters up a eucalyptus tree knows how difficult they are to negotiate and accordingly the photos were taken from a blind located on top of a metal tower erected by the nest tree. The only nests not shown to be in trees were one of an Osprey (*Pandion haliaetus*) and one White-Bellied Sea-Eagle (*Haliaeetus leucogaster*) on rocky pinnacles and those of the Marsh Harrier (*Circus aeruginosus*) on the ground. Australia has some incredibly interesting raptors, notable are the Letter-Winged Kite (*Elanus scriptus*) which, along with the Bat Hawk (*Machaeerhamphus alcinus*) of Africa and Southeast Asia, is a nocturnally hunting "diurnal" raptor and the Spotted Harrier (*Circus assimilis*), the only tree nesting member of the genus.

The authors made some exciting observations from the blind. They saw an adult breeding Australian Kestrel (*Falco cenchroides*) fly to and feed young Black Falcons (*Falco subniger*) that were giving food begging calls in their nest. This smacks of the observations of Ratcliffe (British Bird 56:457, 1962) where kestrels were raised by peregrines (*Falco peregrinus*). They watched a female Brown Falcon (*Falco berigara*) remove one of her dead chicks from a nest just as she did remainders of food not eaten. Removal of uneaten food is an interesting behavior in itself especially if one is familiar with the lack of nest cleaning so common in other large falcons, such as the peregrine, where even dead young remain in their nests if not cannibalized by sibs. Some of their recordings attest to the value of observations from blinds. As further testimony to the value of studies from blinds, I am reminded of a recent conversation with my colleague William Mader where, in checking food remains in nests of a South American hawk, no remains of eels were found (N = 160 remains) but based on observations from a blind at